

Superseded

Technical Specification

**Transport and Main Roads Specifications
MRTS17 Bitumen and Multigrade Bitumen**

March 2022

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Contents

1 Introduction1

2 Definition of terms1

3 Referenced documents1

4 Standard test methods2

5 Quality system requirements2

5.1 Hold Points, Witness Points and Milestones 2

5.2 Binder handling procedures 2

5.3 Conformance requirements 3

6 Material3

7 Manufacture.....3

8 Delivery of bitumen.....3

8.1 General 3

8.2 Binder contamination 3

8.3 Heating 4

8.4 Records 4

8.5 Delivery dockets 4

9 Compliance sampling and testing4

9.1 General 4

9.2 Sampling and testing at point of release from the Manufacturer 5

9.3 Sampling and testing at the point of delivery 7

 9.3.1 *Sampling*7

 9.3.2 *Testing*8

Superseded

1 Introduction

This Technical Specification applies to the material requirements for bitumen and multigrade bitumen for use in both sprayed sealing and asphalt applications for road construction, rehabilitation and maintenance.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Additional terms used in this Technical Specification shall be as defined in Table 2.

Table 2 – Definition of terms

| Term | Definition |
|-------------------------------------|--|
| Auxiliary storage tank | Any tank that is neither a Primary Storage Tank nor a Secondary Storage Tank such as may be found at a supplier's regional bitumen supply depots |
| Bitumen | Bituminous material obtained by processing the material obtained from the refining of naturally occurring crude petroleum |
| Bitumen or multigrade bitumen class | A type of bitumen or multigrade bitumen which is classified according to its viscosity at 60°C as defined in AS 2008 <i>Bitumen for Pavements</i> |
| Contractor's storage tank | A bitumen or multigrade bitumen storage tank located at a Contractor's facility |
| Manufacturer | An organisation which has the necessary plant and equipment to manufacture bitumen or multigrade bitumen to this Technical Specification. For supply only contracts, the Manufacturer shall be the Contractor. |
| Multigrade bitumen | A specialised bitumen class with a viscosity that varies less with temperature than a standard bitumen class (i.e. Multigrade 500 and Multigrade 1000 classes as defined in AS 2008 <i>Bitumen for Pavements</i>) |
| Primary storage tank | The storage tank into which finished bitumen or multigrade bitumen product is initially received within Australia, whether from an Australian refinery production process or from importation into Australia from an international refinery source |
| Secondary storage tank | A storage tank into which bitumen or multigrade bitumen has been transferred from a Primary Storage Tank |
| Site | Where the bitumen or multigrade bitumen is used (includes the asphalt manufacturing plant) |

3 Referenced documents

Table 3 lists documents referenced in this Technical Specification.

Table 3 – Referenced documents

| Reference | Title |
|-----------------|--|
| Advisory Note 7 | <i>Guide to the Heating and Storage of Binders for Sprayed Sealing and Asphalt Manufacture</i> , Australian Asphalt Pavement Association |
| AP-G41 | <i>Bituminous Materials Safety Guide</i> , Austroads |
| AP-T235-13 | <i>Guide to the Selection and Use of Polymer Modified Binders and Multigrade Bitumens</i> , Austroads |
| AS 2008 | <i>Bitumen for Pavements</i> , Standards Australia |
| AS/NZS 2341.10 | <i>Methods of testing bitumen and related roadmaking products. Method 10: Determination of the effect of heat and air on a moving film of bitumen (rolling thin film oven (RTFO) test)</i> , Standards Australia |
| ASTM D2872 | <i>Standard test method for effect of heat and air on a moving film of asphalt (rolling thin-film oven test)</i> |
| AS/NZS ISO 9001 | <i>Quality Management Systems: Requirements</i> , Standards Australia |
| ISO 9001 | <i>Quality Management Systems: Requirements</i> , International Organisation for Standardisation |

4 Standard test methods

The test methods applicable to this Technical Specification are those listed in the latest version of the Australian Standard AS 2008 *Bitumen for Pavements*.

Density testing can also be performed using Test Method Q331.

5 Quality system requirements

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Witness Point applicable to this Technical Specification is shown in Table 5.1. There are no Hold Points or Milestones defined.

Table 5.1 – Hold Point, Witness Point, Milestones

| Clause | Hold Point | Witness Point | Milestone |
|--------|------------|--------------------------------------|-----------|
| 9.3.1 | | 1. Sampling at the point of delivery | |

5.2 Binder handling procedures

The Contractor shall prepare documented procedures for all required processes as defined in Clause 6 of MRTS50 *Specific Quality System Requirements* and be consistent with the requirements of this Technical Specification, MRTS30 *Asphalt Pavements* and MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*, as appropriate. These procedures shall be included in the respective asphalt quality plan in MRTS30 *Asphalt Pavements* or construction procedures in MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*.

5.3 Conformance requirements

Materials supplied to this Technical Specification shall be sampled and tested in accordance with Clause 9.

The conformance requirements which apply to this Technical Specification are specified in Clause 6.

6 Material

Bitumen shall comply with the requirements of the latest version of AS 2008 *Bitumen for Pavements*. Density at 15°C shall be tested in accordance with the frequencies given in Clause 9 and the results reported.

7 Manufacture

The bitumen or multigrade bitumen Manufacturer shall:

- a) operate a quality management system certified to AS/NZS ISO 9001 for product manufactured in Australia
- b) operate a quality management system certified to ISO 9001 or equivalent for product manufactured outside Australia
- c) operate to an inspection and test plan acceptable to Transport and Main Roads for manufacturing and supplying bitumen or multigrade bitumen which demonstrates compliance with this Technical Specification. The inspection and test plan shall include testing of binders (especially binders stored at depots), analysis of results (including control charts) and a requirement for a copy of the results to be forwarded promptly to Transport and Main Roads.
- d) ensure that material supplied from depots can be traced to the production batch and associated test report.

8 Delivery of bitumen

8.1 General

The handling, storage, transport, heating and transfer of bitumen and multigrade bitumen shall comply with the requirements and practices outlined in the latest versions of the following documents:

- a) Austroads – *Bituminous Materials Safety Guide*, AP-G41, and
- b) AAPA Advisory Note 7 – *Guide to the Heating and Storage of Binders for Sprayed Sealing and Asphalt Manufacture*.

8.2 Binder contamination

Bitumen and multigrade bitumen shall be stored and transported in purpose-built containers and transferred between containers in such a way that contamination does not occur, the resultant product complies with this Technical Specification and the performance of the product is not adversely affected.

As necessary, storage and delivery vessels, sprayers and hoses shall be flushed or cleaned with appropriate solvent before transfer of binder has commenced. Residues from flushing and cleaning shall be removed before transfer.

If contamination of the binder is suspected, additional sampling and testing may be ordered by the Administrator to confirm compliance of the binder with the requirements of this Technical Specification.

8.3 Heating

Bitumen and multigrade bitumen shall not be heated to temperatures greater than the maximum values listed in the latest version of AAPA Advisory Note 7 – *Guide to the Heating and Storage of Binders for Sprayed Sealing and Asphalt Manufacture*. The rate of increase in temperature shall not be allowed to exceed 20°C per hour

8.4 Records

Records shall be kept for the handling, storage, transport, heating and transfer of bitumen and multigrade bitumen from the date/time of sampling at the point of release from the Manufacturer until such time as the binder is incorporated into the Works.

These records shall include the binder's class and history, including (as relevant):

- a) dates, times, production batch numbers, classes and volumes of transfers in to and out of the storage container
- b) date, time and amount of any additives (e.g. cutter oil and/or adhesion agent) incorporated into the binder, and
- c) duration of storage, temperature over time, and degree of agitation during any period of storage.

8.5 Delivery dockets

Deliveries of bitumen and multigrade bitumen to the Site shall be accompanied by a delivery docket giving at least the following information:

- a) name of the manufacturer
- b) location and date of manufacture
- c) bitumen or multigrade bitumen class
- d) production batch number
- e) storage and heating information (i.e. location, date, time, temperature), and
- f) certification that the bitumen or multigrade bitumen has been sampled prior to release from the manufacturer, tested as stated in Clause 9 and the properties comply with Clause 6.

Delivery dockets shall be made available for inspection by the Administrator and shall be included in the quality records.

9 Compliance sampling and testing

9.1 General

Sufficient sampling and testing shall be carried out to ensure that the bitumen or multigrade bitumen complies with the property requirements of Clause 6. Sampling of bitumen shall be performed so that the sample is representative of the material present in the container in which it is held. The procedures described in Clause 2.5 and Clause 2.6 of AS 2008 *Bitumen for Pavements* shall be followed during sampling.

Sampling and testing shall take place at the point of release from the Manufacturer and at the point of delivery. The minimum requirements are as follows:

- a) Sampling and testing at the point of release from the Manufacturer shall be in accordance with Clause 9.2.
- b) Sampling and testing at the point of delivery to the sprayer (where the bitumen or multigrade bitumen is supplied by the Contractor) or from the asphalt binder storage tank shall be in accordance with Clause 9.3.

9.2 Sampling and testing at point of release from the Manufacturer

Sampling and testing of bitumen and multigrade bitumen at the point of release from the Manufacturer shall be undertaken by the Manufacturer

A batch shall be defined as the quantity of bitumen or multigrade bitumen stored in a single tank by the Manufacturer at any particular time. The binder in the storage tank shall be considered a new batch whenever new material is added to the storage tank.

The minimum frequency of sampling and testing from Manufacturer's storage tanks shall be as stated in Table 9.2(a), Table 9.2(b) and Table 9.2(c).

All test results obtained from each batch shall be included in the relevant construction lot record.

Table 9.2(a) – Manufacturer testing schedule for class 170, 240, 320 and 600 bitumen

| Properties to be Tested | Frequency of Testing | | |
|--|----------------------|--|--|
| | Primary Storage Tank | Secondary Storage Tank | Auxiliary ¹ Storage Tank |
| | Each Batch | 4 Weekly and on each Change in Binder Class/Type | 4 Weekly and on each Change in Binder Class/Type |
| Viscosity at 60°C | ✓ ² | ✓ | ✓ |
| Viscosity at 135°C | ✓ | – | |
| Penetration at 25°C | ✓ ² | 3 monthly | |
| Flashpoint | 3 monthly | – | |
| Matter insoluble in toluene | 3 monthly | – | |
| Viscosity at 60°C, percentage of original after RTFO treatment | ✓ | 3 monthly | |
| Density at 15°C | 3 monthly | – | |

¹ For tanks currently in service only (i.e. those held at temperatures at or above the minimum temperature for medium term storage listed for the type of binder in AAPA Advisory Note 7).

² Bitumen shall be retested each four weeks if it has been stored without the addition of new material.

Table 9.2(b) – Manufacturer testing schedule for class 450 bitumen

| Properties to be Tested | Frequency of Testing | | |
|--|----------------------|--|--|
| | Primary Storage Tank | Secondary Storage Tank | Auxiliary ¹ Storage Tank |
| | Each Batch | 4 Weekly and on each Change in Binder Class/Type | 4 Weekly and on each Change in Binder Class/Type |
| Viscosity at 60°C | ✓ | | |
| Viscosity at 135°C | ✓ | – | |
| Penetration at 25°C | ✓ | | |
| Flashpoint | 3 monthly | – | |
| Matter insoluble in toluene | 3 monthly | – | |
| Viscosity at 60°C, after RTFO treatment | ✓ ² | ✓ | ✓ |
| Penetration at 25°C after RTFO treatment | ✓ ² | ✓ | |
| Density at 15°C | 3 monthly | – | |
| Mass change | 3 monthly | – | |

¹ For tanks currently in service only (i.e. those held at temperatures at or above the minimum temperature for medium term storage listed for the type of binder in AAPA Advisory Note 7).

² Bitumen shall be retested each four weeks if it has been stored without the addition of new material.

Table 9.2(c) – Manufacturer testing schedule for multigrade 500 and 1000 bitumen

| Properties to be Tested | Frequency of Testing | | |
|--|----------------------|---|---|
| | Primary Storage Tank | Secondary Storage Tank | Auxiliary ¹ Storage Tank |
| | Each Batch | Fortnightly and on each Change in Binder Class/Type | Fortnightly and on each Change in Binder Class/Type |
| Viscosity at 60°C | ✓ ² | M500 only | M500 only |
| Viscosity at 135°C | ✓ | – | |
| Penetration at 25°C | ✓ ² | M500 only | |
| Flashpoint | 3 monthly | – | |
| Matter insoluble in toluene | 3 monthly | – | |
| Viscosity at 60°C, after RTFO treatment | ✓ ³ | M1000 only | M1000 only |
| Penetration at 25°C after RTFO treatment | ✓ ³ | M1000 only | |
| Density at 15°C | 3 monthly | – | |
| Mass change | 3 monthly | – | |

¹ For tanks currently in service only (i.e. those held at temperatures at or above the minimum temperature for medium term storage listed for the type of binder in AAPA Advisory Note 7).

² M500 bitumen shall be retested each two weeks if it has been stored without the addition of new material.

³ M1000 bitumen shall be retested each two weeks if it has been stored without the addition of new material.

9.3 Sampling and testing at the point of delivery

9.3.1 Sampling

Bitumen and multigrade bitumen shall be sampled by the Contractor at the point of delivery.

For sprayed sealing work, a compliance testing sample and a sample for the Administrator shall be taken from the tanker/storage tank immediately prior to transfer or during each transfer of binder from the tanker/storage tank to the sprayer. **Witness Point 1** Unless otherwise directed by the Administrator, where a single tanker/storage tank load of binder is being transferred multiple times to the sprayer during the same work shift, only one sample needs to be obtained.

For asphalt works, a compliance testing sample and a sample for the Administrator shall be taken from the binder storage tank immediately prior to the commencement of asphalt production for each work shift.

Each sample shall be one litre (1 L). Samples shall be labelled at the time of sampling and appropriately stored to avoid contamination or deterioration for a minimum of 12 months, or for the duration of the project's defect liability/correction period, whichever is greater.

Sample labels would typically contain the following information:

- designation or classification of the binder
- name of supplier / manufacturer
- batch or identification number
- date and time of sampling
- sampling location
- type and identifying number of the container or vehicle where the sample was taken
- name of sampler
- identification mark or sample number
- project name or number
- sampling temperature.

9.3.2 Testing

9.3.2.1 Testing frequencies

For bitumen and multigrade bitumen, the minimum testing frequencies for point of delivery testing are provided in Table 9.3.2.1.

Where the Contractor is able to provide suitable, traceable and auditable records to the Administrator that demonstrate the binder has been handled, stored, transported, heated and transferred in accordance with this Technical Specification and the latest version of AAPA Advisory Note 7 – *Guide to the Heating and Storage of Binders for Sprayed Sealing and Asphalt Manufacture*, the frequency of compliance testing for each class of bitumen and multigrade bitumen from each manufacturer shall be at the ‘normal frequency’. If the Contractor is unable to demonstrate compliance with the above requirements, an ‘increased frequency’ shall be adopted.

A ‘normal frequency’ shall immediately change to an ‘increased frequency’ if a nonconforming sample has been detected. The frequency may return to the ‘normal frequency’ after no nonconformances have occurred in four consecutive compliance test samples.

Where the binder has not been stored in accordance with the latest version of AAPA Advisory Note 7 – *Guide to the Heating and Storage of Binders for Sprayed Sealing and Asphalt Manufacture*, the ‘increased frequency’ shall apply.

Table 9.3.2.1 – Minimum testing frequencies at the point of delivery for Contractor supplied bitumen

| Bitumen and Multigrade Bitumen Class | Property to be Tested | Normal Frequency | Increased Frequency |
|--|--|---|--------------------------------|
| Class 170, 240, 320 and 600 bitumen and Multigrade 500 bitumen | Viscosity at 60°C | The first compliance testing sample and then every 10th compliance testing sample thereafter for a particular bitumen or multigrade bitumen class | Each compliance testing sample |
| Class 450 bitumen and Multigrade 1000 bitumen | Viscosity at 60°C after RTFO treatment | | |

In addition to the requirements of MRTS50 *Specific Quality System Requirements*, and unless otherwise specified or agreed with the Administrator, the extents of conforming and nonconforming works shall be determined based on the midpoint between adjacent binder tests.

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